Torque Specifications

Description	Nm	lb-ft	lb-in
Air cleaner and duct assembly bolt	7	62	—
Coolant supply and return manifold [a]	—	—	—
Charge air cooler bolts [a]	**—**	**—**	**—**
Supercharger mounting bolts [a]	—	—	—
Air intake scoop bolts	25	18	—
Air intake scoop bracket bolt	25	18	—
Air intake scoop bracket nuts	25	18	—
Air intake scoop bracket throttle body nut	9	—	80
Exhaust gas recirculation (EGR) vacuum regulator solenoid bolts	10	—	89

[a] Refer to the procedure

Intake Air Distribution and Filtering

The air intake system consists of the:

- air intake scoop (Mach I)
- air cleaner (ACL).
- air cleaner (ACL) element.
- mass air flow (MAF) sensor.
- air cleaner outlet tube.
- air cleaner and duct assembly.

The air intake system:

- cleans intake air with an air cleaner element.
- measures air flow with a MAF sensor. For additional information, refer to Section 303-14 .

Intake Air Distribution and Filtering —Supercharger, Charge Air Cooler

The supercharger (SC) is a positive displacement pump. Its purpose is to supply an excess volume of intake air to the engine by increasing air pressure and density in the intake manifold. The supercharger is matched to the engine by its displacement and belt ratio, and can provide excess airflow at any engine speed.

NOTE: The supercharger is repaired only as an assembly. Disassembly of the supercharger unit may void the warranty.

NOTE: The supercharger is not a bolt-on option. It is part of an integrated engine system. Many components of the supercharged engine are not interchangeable with similar parts from a non-supercharged engine.

The supercharger contains two three-lobed rotors. The helical shape and specialized porting provide a smooth discharge flow and low level of noise during operation. The rotors are supported by ball bearings in front and needle bearings at the rear. The drive gears are pressed into place, therefore the supercharger is installed new as a unit, and is not repairable.

The supercharger system is a blow-through type with the fuel injected directly into the intake ports. The supercharger is belt driven off the crankshaft through an idler pulley. The throttle body controls the amount of intake air to the supercharger through the intake plenum. Air from the supercharger is routed through the charge air cooler (CAC), then to the intake manifold. The resulting denser air charge in the combustion chamber provides for a higher power output of the engine over a non-supercharged engine of the same displacement.

NOTE: It is not possible to increase manifold pressure or engine power output by altering the bypass valve or the actuator.

At partial-throttle opening or when vacuum is present in the intake system, a vacuum-controlled bypass valve reroutes some discharged air from the supercharger back through the intake plenum. This prevents the supercharger from cavitating, causing reduced performance, increased temperatures, and poor fuel economy.

The supercharger has a self-contained oiling system that does not require a fluid change for the life of the vehicle. However, at every 30,000 mile interval, the supercharger fluid level should be checked. The vehicle should be parked on a level surface, the engine cool, and not running. To check the oil, remove the Allen head plug located at the front of the supercharger. The oil level should be at the bottom of the fill plug threads when cold. If the fluid level is low, add Synthetic Supercharger Fluid E9SZ-19577-A or equivalent meeting Ford specification ESE-M99C115–A

Supercharged vehicles are equipped with a charge air cooler (CAC). The CAC cools the pressurized air from the supercharger, increasing the air density, which improves combustion efficiency, engine horsepower and torque.

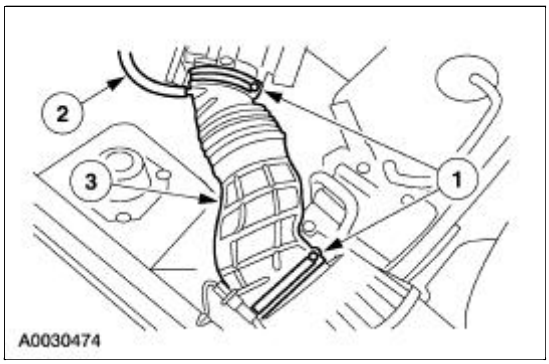
Intake Air Distribution and Filtering

Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.

Air Cleaner Outlet Pipe —3.8L

Removal and Installation

1. Remove the air cleaner outlet tube.
    1. Loosen the clamps.
    2. Disconnect the hose.
    3. Remove the tube.

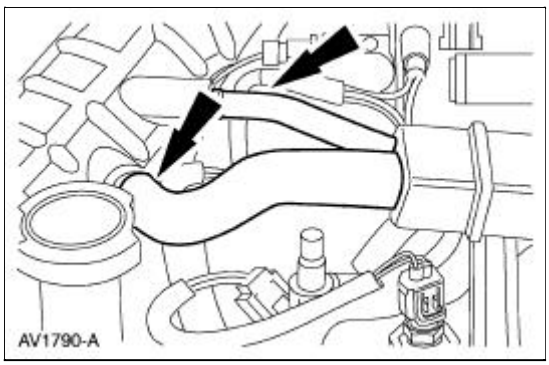


2. To install, reverse the removal procedure.

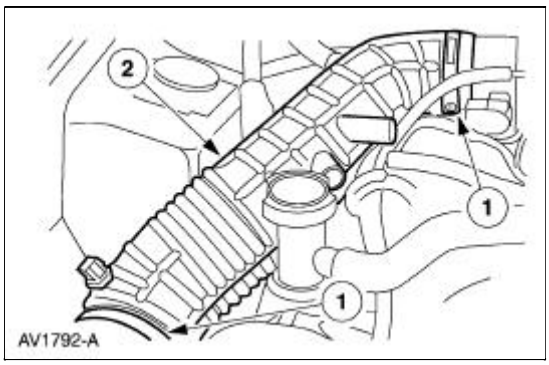
Air Cleaner Outlet Pipe —4.6L (2V)

Removal and Installation

1. Disconnect the hoses.



2. Remove the air cleaner outlet tube.
    1. Loosen the clamps.
    2. Remove the tube.



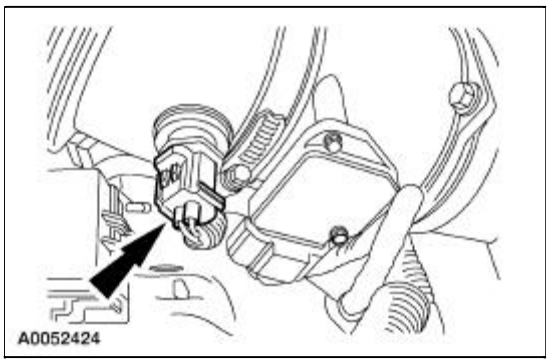
3. To install, reverse the removal procedure.

Air Cleaner Outlet Pipe —4.6L (4V)

Removal and Installation

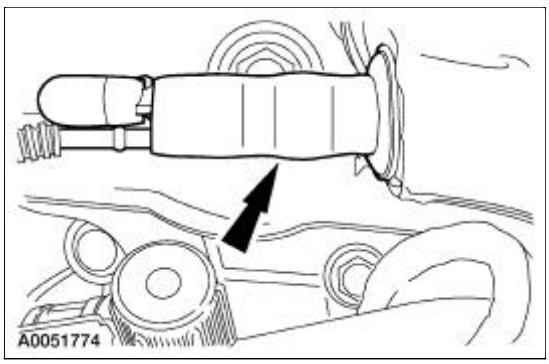
Cobra

1. Disconnect the intake air temperature (IAT) sensor.

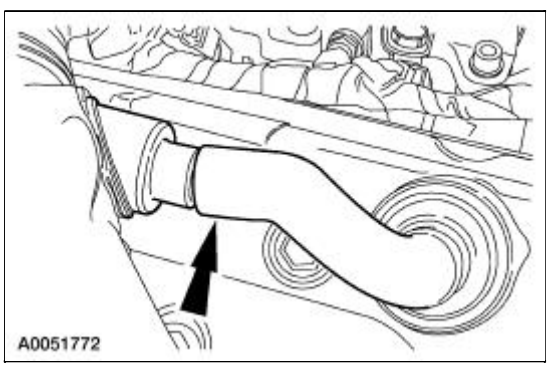


All vehicles

2. Disconnect the vacuum hose.

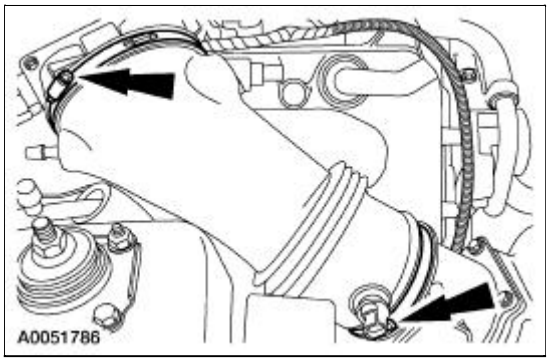


3. Disconnect the breather hose.



NOTE: Cobra shown, Mach I similar.

4. Loosen the clamps and remove the air cleaner outlet pipe.



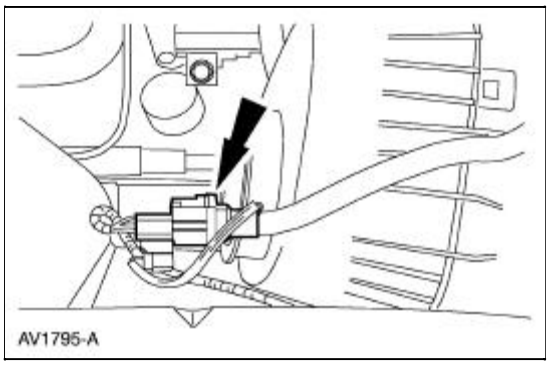
5. To install, reverse the removal procedure.

Air Cleaner —3.8L

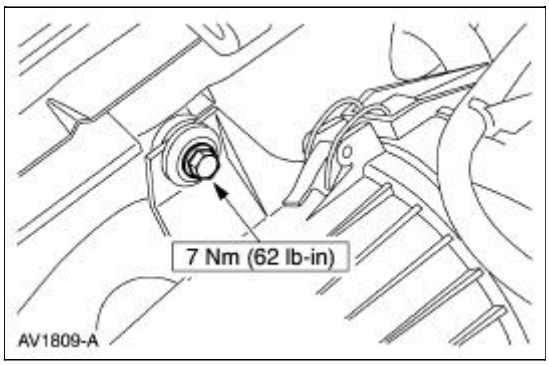
Removal and Installation

1. Remove the air cleaner outlet tube from the throttle body. For additional information, refer to Air Cleaner Outlet Pipe—3.8L in this section.

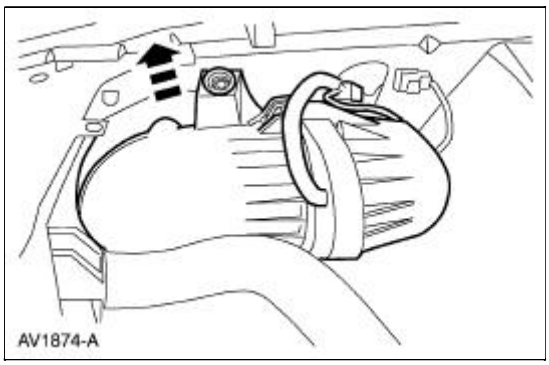
2. Disconnect the connector.



3. Remove the bolt.



4. Remove the air cleaner and duct assembly.



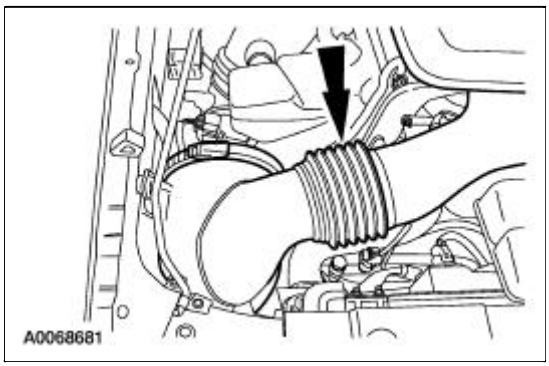
5. To install, reverse the removal procedure.

Air Cleaner —4.6L (2V) and 4.6L (4V)

Removal and Installation

Mach I

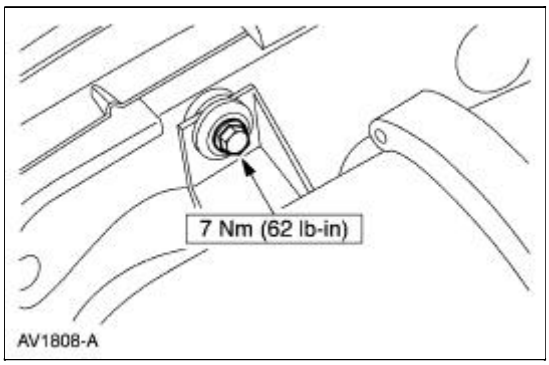
1. Disconnect the air intake scoop outlet tube.



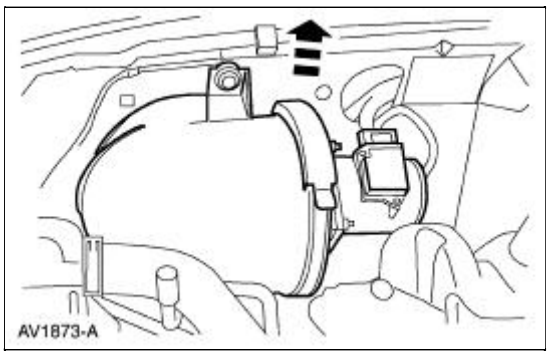
All vehicles

2. Remove the air cleaner outlet tube from the throttle body. For additional information, refer to Air Cleaner Outlet Pipe—4.6L (2V) or Air Cleaner Outlet Pipe—4.6L (4V) in this section.

3. Remove the bolt.



4. Remove the air cleaner and duct assembly.



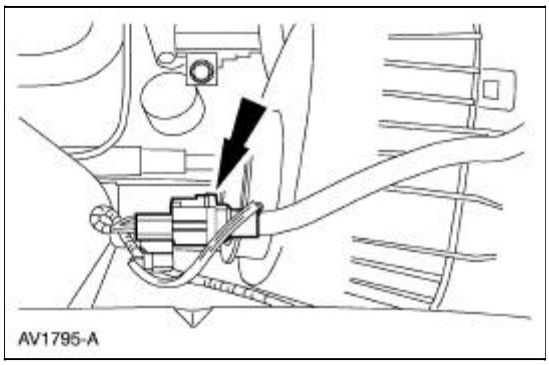
5. To install, reverse the removal procedure.

Air Cleaner Element —3.8L

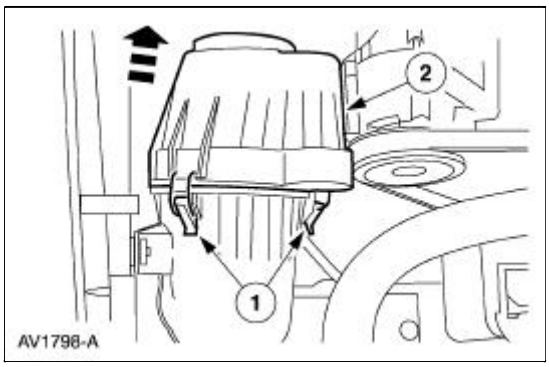
Removal and Installation

1. Remove the air cleaner outlet tube. For additional information, refer to Air Cleaner Outlet Pipe—3.8L in this section

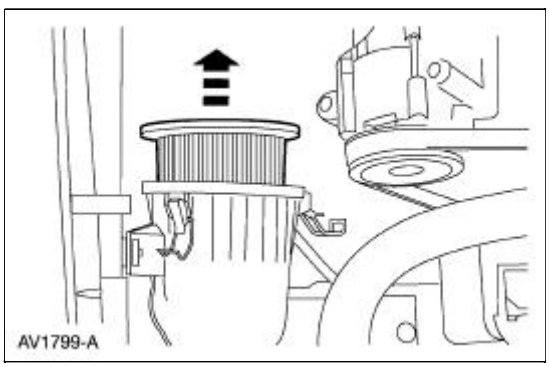
2. Disconnect the connector.



3. Remove the mass air flow (MAF) sensor.
    1. Release the clips.
    2. Remove the MAF sensor assembly.



4. Remove the air cleaner element.



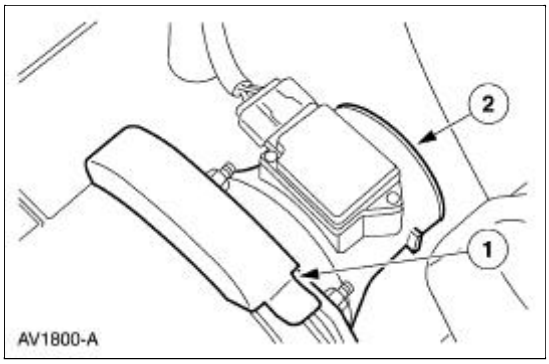
5. To install, reverse the removal procedure.

Air Cleaner Element —4.6L (2V)

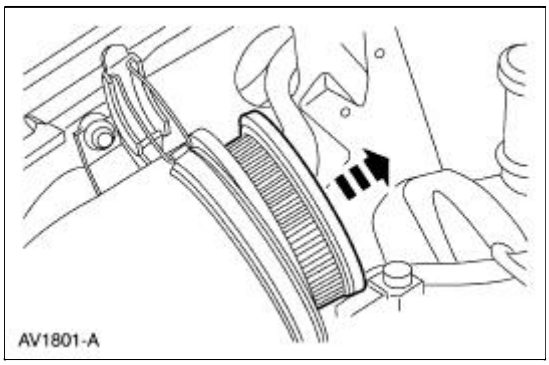
Removal and Installation

1. Remove the air cleaner outlet tube (9B659). For additional information, refer to Air Cleaner Outlet Pipe—4.6L (2V) in this section.

2. Remove the mass air flow (MAF) assembly.
    1. Release the clip.
    2. Remove the MAF sensor assembly and position aside.



3. Remove the air cleaner element.



4. To install, reverse the removal procedure.

Air Cleaner Element —4.6L (4V)

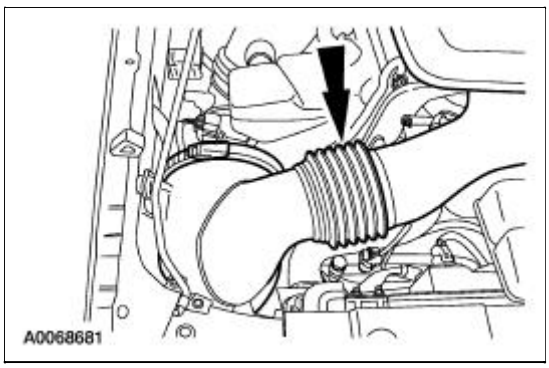
Removal and Installation

1. Open the air cleaner housing.
2. Remove the element.
3. To install, reverse the removal procedure.

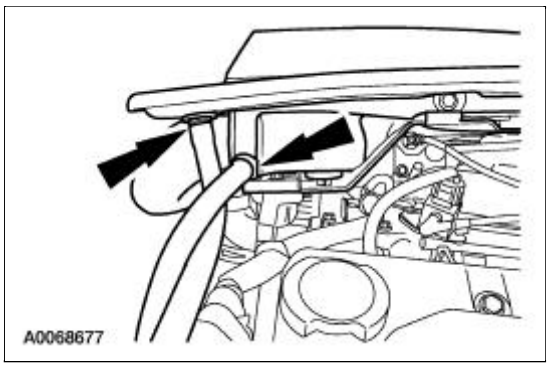
Air Intake Scoop

Removal and Installation

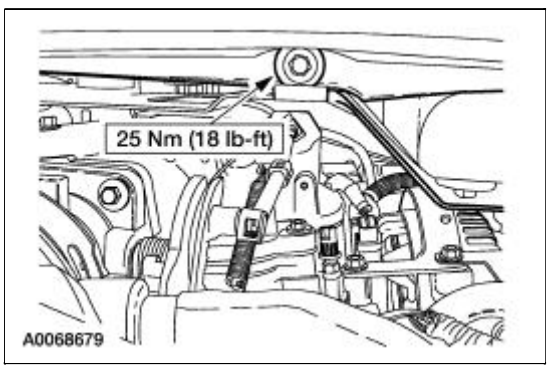
1. Disconnect the air intake scoop outlet from the air cleaner.



2. Disconnect the air intake scoop water drain hoses.



3. Remove the air intake scoop from the air intake scoop bracket.
   - Remove the two air intake scoop bolts.
   - Lift the air intake scoop from the air intake bracket studs.

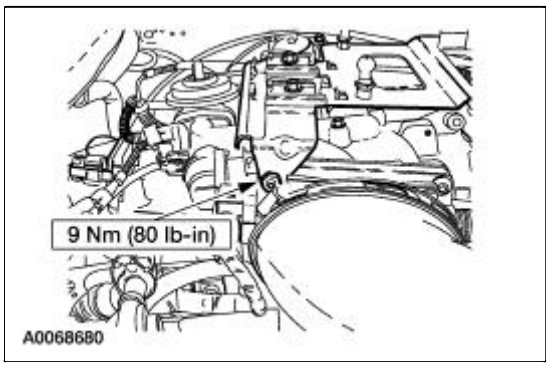


4. To install, reverse the removal procedure.

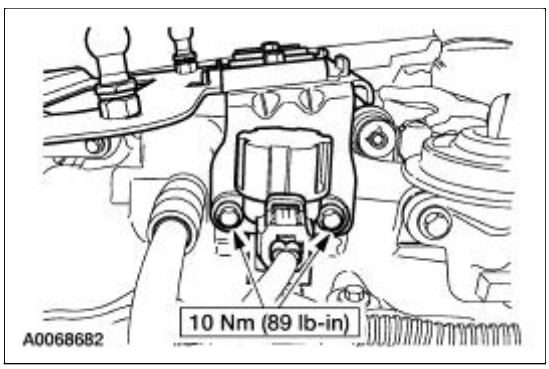
Air Intake Scoop Bracket

Removal and Installation

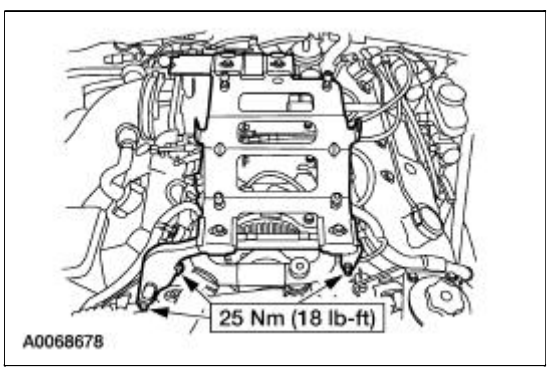
1. Remove the air intake scoop. For additional information, refer to Air Intake Scoop in this section.
2. Remove the air intake scoop bracket nut at the throttle body.



3. Remove the exhaust gas recirculation (EGR) vacuum regulator solenoid bolts and position the EGR vacuum regulator solenoid aside.



4. Remove the air intake scoop bracket nuts and the air intake scoop bracket bolt and remove the air intake scoop bracket from the engine.



5. To install, reverse the removal procedure.

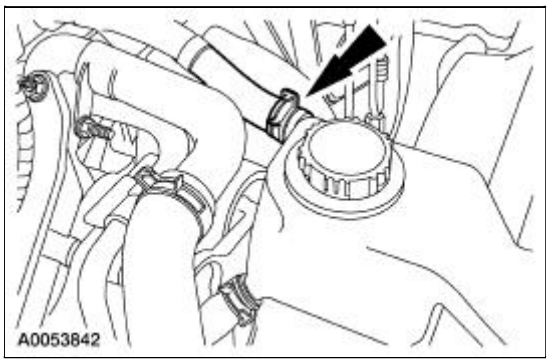
Charge Air Cooler

Material

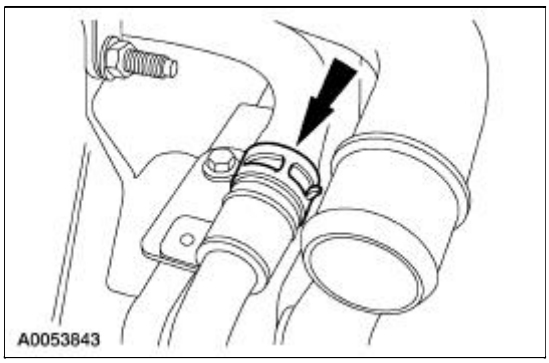
Item	Specification
Silicone Gasket and Sealant F7AZ-19554-EA or equivalent	WSE-M4G323-EA

Removal and Installation

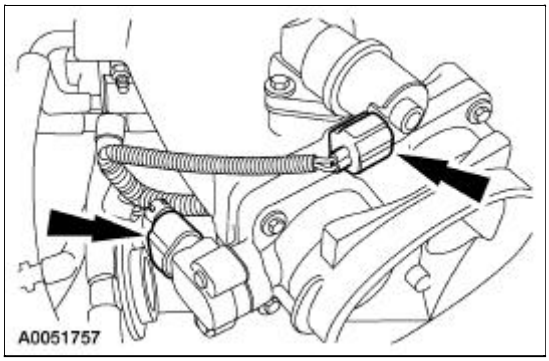
1. Drain the supercharger coolant. For additional information, refer to Section 303-03B .
2. Release the fuel pressure. For additional information, refer to Section 310-00 .
3. Disconnect the supercharger degas hose.



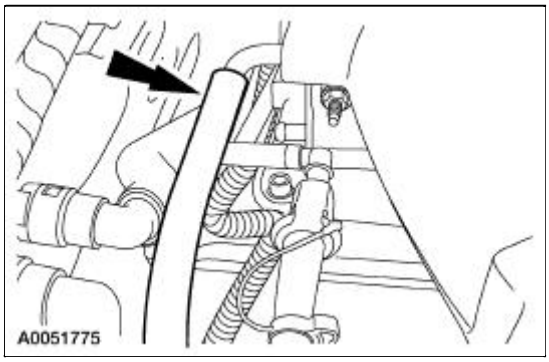
4. Disconnect the coolant hose.



5. Remove the supercharger belt. For additional information, refer to Section 303-05 .
6. Remove the air cleaner outlet tube. For additional information, refer to Section 303-12 .
7. Disconnect the throttle position (TP) sensor and the idle air control (IAC) valve electrical connectors.

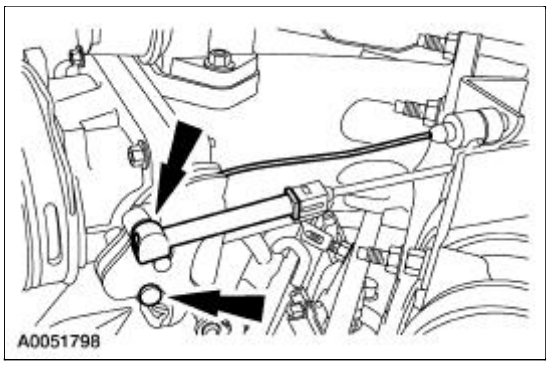


8. Disconnect the vacuum hose.

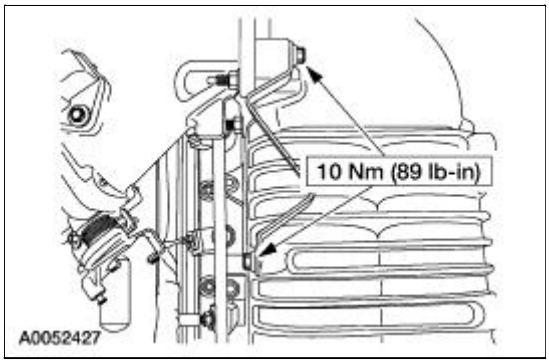


9. Disconnect the fuel supply spring lock coupler. For additional information, refer to Section 310-00 .

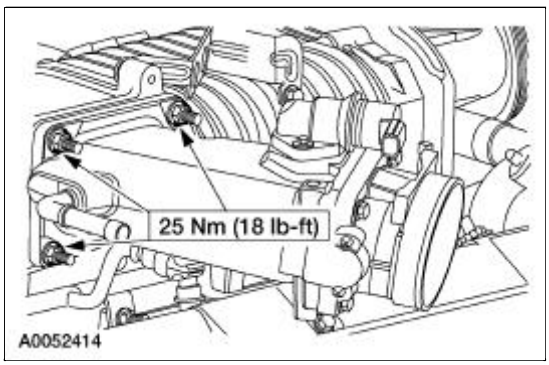
10. Disconnect the accelerator controls.
    - Disconnect the accelerator cable.
    - If equipped, disconnect the speed control cable.



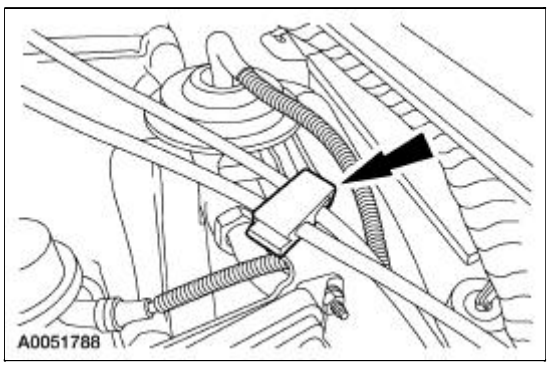
11. Remove the accelerator cable bracket bolts.



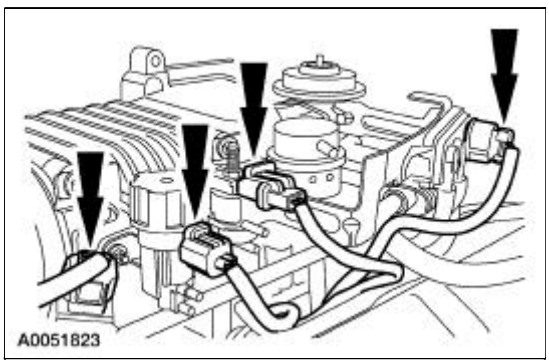
12. Remove the throttle body and spacer assembly.



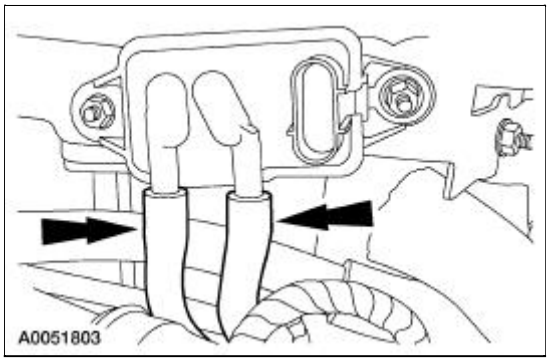
13. Release the clip and position the accelerator cable bracket and the cables aside.



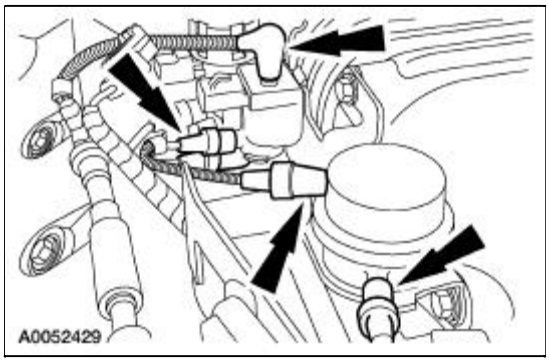
14. Disconnect the electrical connectors from the fuel pulse damper, EGR vacuum regulator solenoid, supercharger bypass vacuum solenoid, and the differential pressure feedback EGR system.



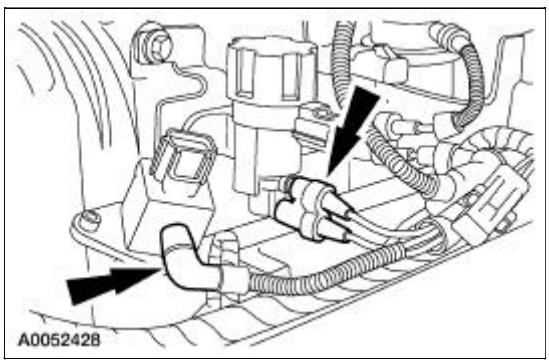
15. Disconnect the vacuum hoses from the differential pressure feedback EGR system.



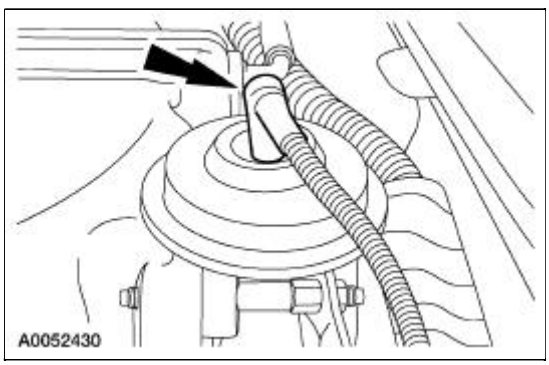
16. Disconnect the vacuum hoses from the supercharger bypass vacuum solenoid, and the actuator.



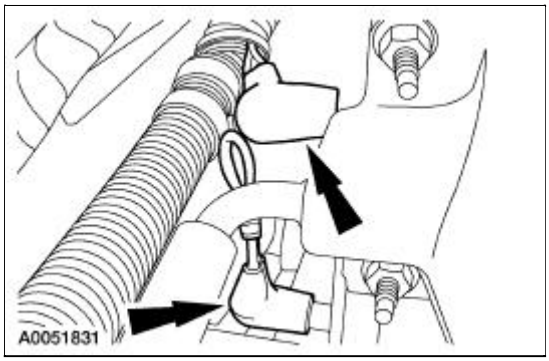
17. Disconnect the vacuum hoses from the fuel pulse damper and the EGR vacuum regulator solenoid.



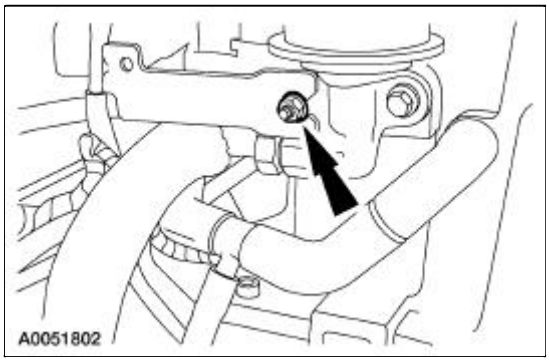
18. Disconnect the vacuum hose from the EGR valve.



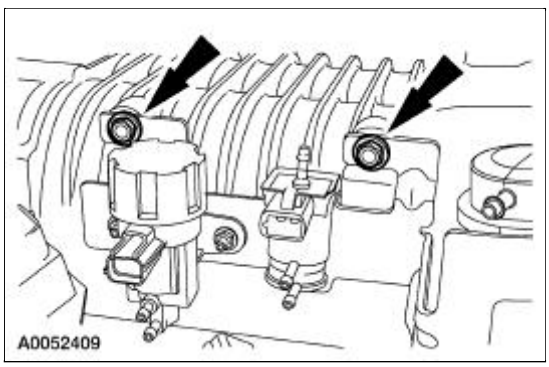
19. Disconnect the vacuum hoses at the back of the supercharger and position the vacuum harness aside.



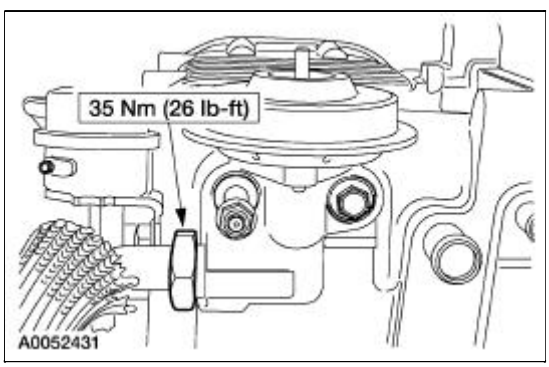
20. Remove the vacuum accessory bracket mounting nut.



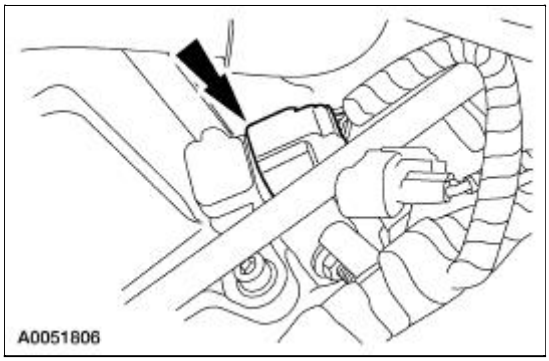
21. Remove the mounting bolts, and the vacuum accessory bracket.



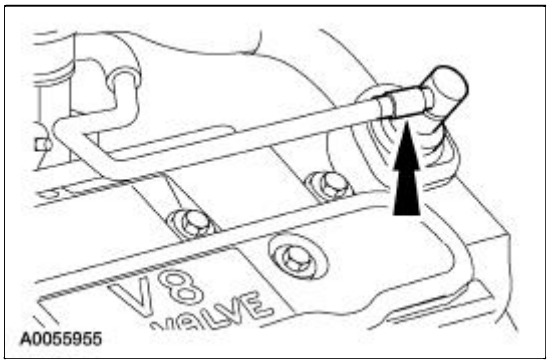
22. Disconnect the exhaust manifold to EGR valve tube.



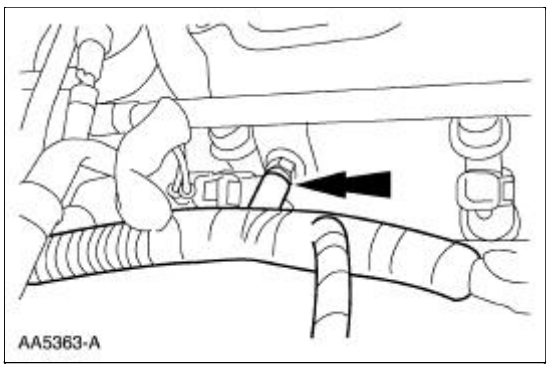
23. Disconnect the barometric pressure (BARO) sensor electrical connector.



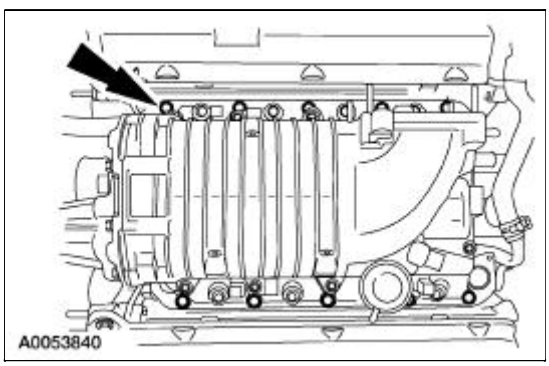
24. Disconnect the positive crankcase ventilation (PCV) hose.



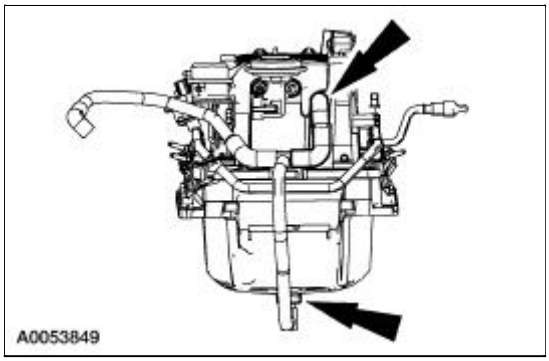
25. Separate the fuel charging wiring harness from the fuel injection supply manifold in four places and position the harness aside.



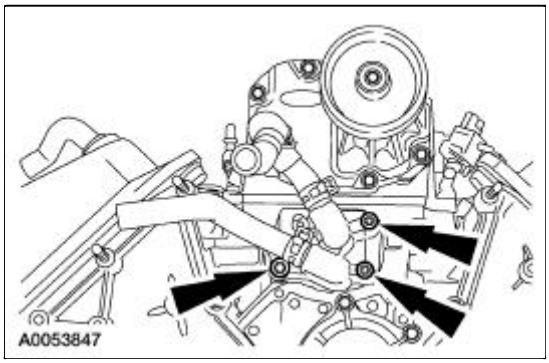
26. Remove the ten bolts, the intake manifold, supercharger and fuel supply manifold as an assembly.



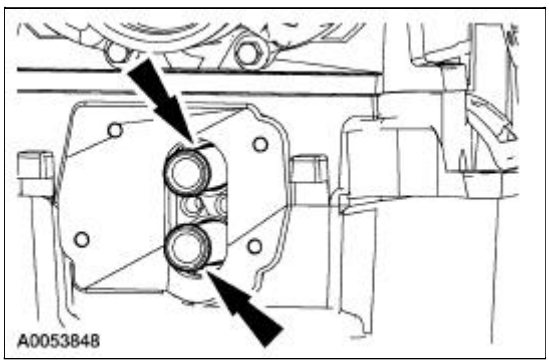
27. Disconnect and remove the PCV hoses.



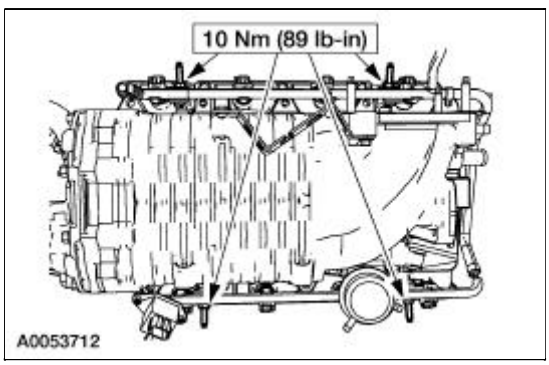
28. Remove the coolant supply and return manifold.



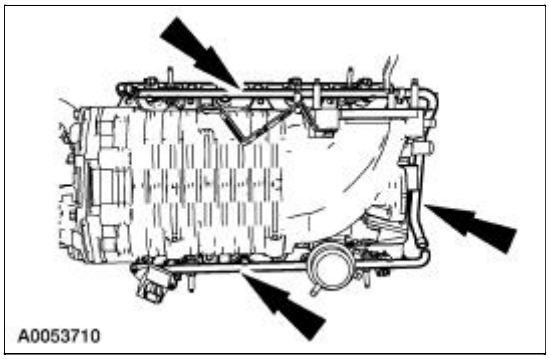
29. Remove the coolant supply and return tubes and seals.



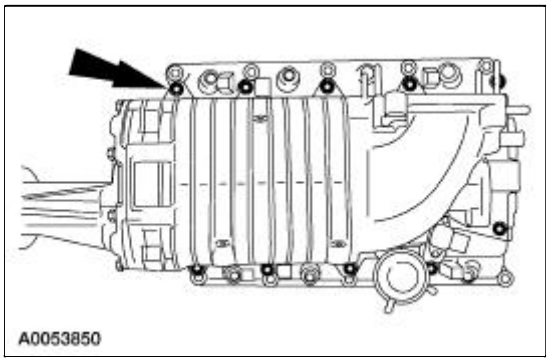
30. Remove the fuel supply manifold mounting studs.



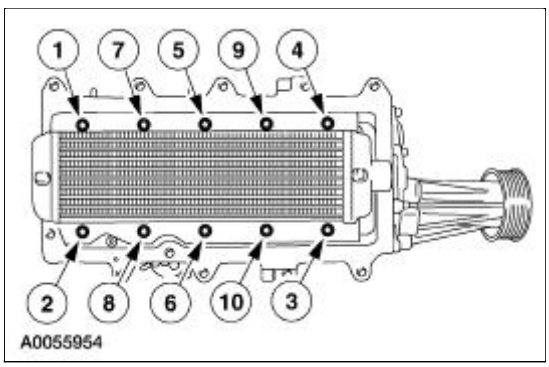
31. Remove the fuel supply manifold and fuel injectors as an assembly.



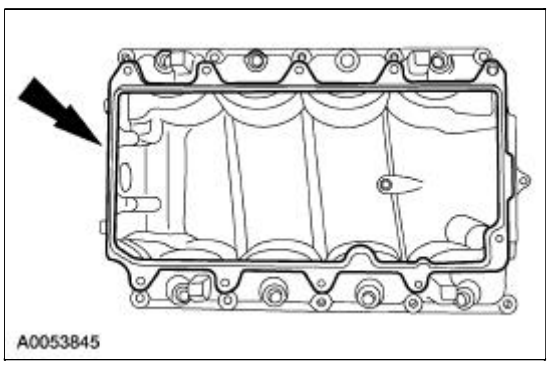
32. Remove the bolts, the supercharger and charge air cooler (CAC) assembly.



33. Remove the bolts and the CAC in the sequence shown.

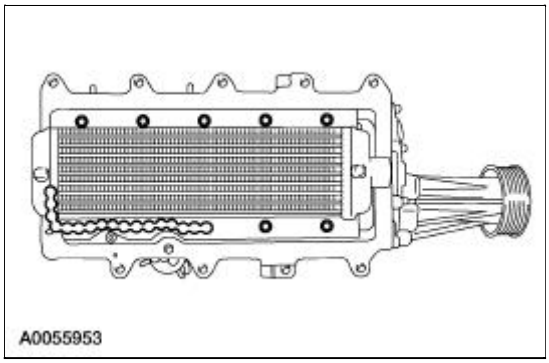


34. Inspect the CAC plenum gasket and install a new gasket if necessary.



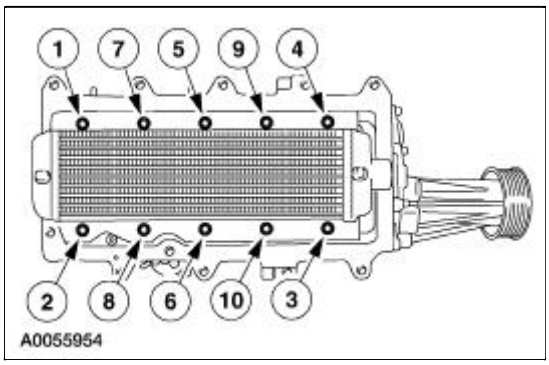
35. To install, reverse the removal procedure

36. Apply a bead of sealant in the areas shown on the supercharger flange between the CAC and the supercharger.

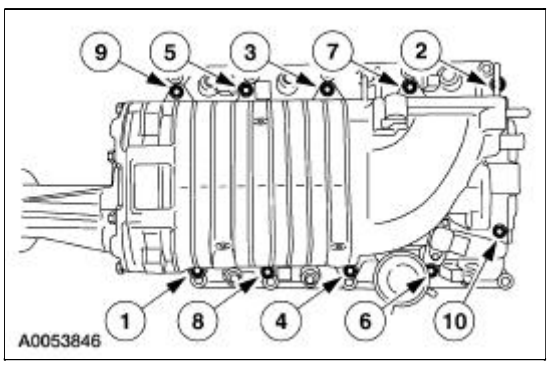


37. **NOTE:** Once the torque procedure has been started, final tightening must be finished within five minutes maximum.

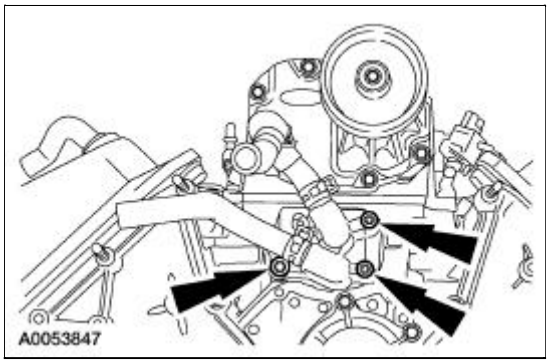
    Tighten the CAC bolts in the sequence shown in two stages.
    1. Tighten to 2 Nm (18 lb-in).
    2. Tighten to 6 Nm (53 lb-in).



38. Tighten the supercharger and CAC cooler assembly-to-lower intake manifold bolts in the sequence shown in three stages.
    1. Tighten to 2 Nm (18 lb-in).
    2. Tighten to 25 Nm (18 lb-ft).
    3. Tighten an additional 90 degrees.

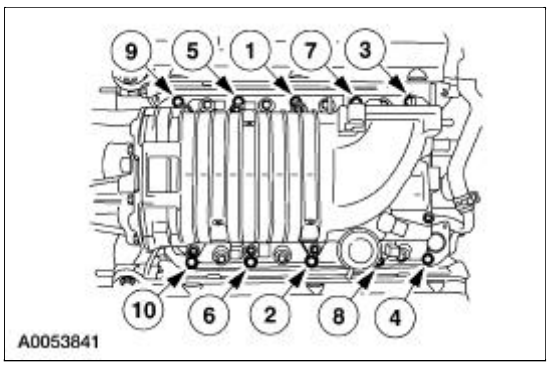


39. Tighten the coolant supply and return manifold in two stages.
    1. Tighten to 10 Nm (89 lb-ft).
    2. Tighten an additional 90 degrees.



40. **NOTE:** Inspect the intake manifold gaskets and install new gaskets, if necessary.

    Tighten the lower intake manifold bolts in the sequence shown.



41. Fill and bleed the supercharger cooling system. For additional information, refer to Section 303-03B .